

# PATENT ABSTRACTS OF JAPAN

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## (54) DISPLAY DEVICE

(57)Abstract:

**PURPOSE:** To optimally and easily adjust every kind of display condition by software without using an adjusting volume.

**CONSTITUTION:** This device is comprised by providing a display presentation circuit 23 which outputs image information to be displayed on a display part as a display signal, an adjusting data sending circuit 25 which sends out display condition adjusting data based on an instruction from an input part 3, and a superposition circuit 26 which superimposes the display condition adjusting data on the display signal at a control part 2, and providing an adjusting data separation circuit 11 which separates the display condition adjusting data from the display signal by receiving a signal sent from the control part 2, a register group 12 for adjusting data holding which holds the adjusting data changed according to separated display condition adjusting data, and a control means 13 which controls the display condition of a picture being displayed on the display part 14 according to those adjusting data at a display part 1.

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## CLAIMS

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[Claim(s)]

[Claim 1] The display section which needs the adjustment for making human being's vision suit, The control section which outputs the image information displayed on this display section as a display signal, It is the display unit equipped with the input section which combines with this control section and inputs various kinds of data and indication signals. A display condition directions means to perform the directions for adjusting and setting the display condition of the screen displayed on said display section as said input section is established. The display display circuit which outputs the image information displayed on the display section to said control section as a display signal, The adjustment data forwarding circuit which sends out display condition adjustment data based on the directions from said input section, The superposition circuit which superimposes the display condition adjustment data from said adjustment data forwarding circuit on a display signal from a display display circuit is prepared. The adjustment data separation circuit which receives the signal sent from the control section in said display section, and divides display condition adjustment data and a display signal into it, The register group for adjustment data-hold holding the adjustment data changed according to the separated display condition adjustment data, The display unit characterized by establishing the control means which controls the display condition of the screen displayed on the display section according to the adjustment data currently held at these register groups for adjustment data-hold.

[Claim 2] The screen for display condition adjustment displayed on the display section based on the directions for adjusting and setting up the display condition of a screen is a display unit according to claim 1 characterized by being constituted including the directions carbon button of the simulation display which directs a rise/down of

adjustment data, and the test pattern with which a display condition is changed according to actuation of the carbon button concerned.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the display unit constituted in more detail so that software could adjust a display unit, for example, brightness, and the analog adjustment element (adjustment for making human being's vision suit) like contrast about the display unit applied to equipment with displays, such as a computer, a personal computer, and an engineering workstation.

[0002]

[Description of the Prior Art] Adjustment volume, contrast adjustment volume, etc. for adjusting brightness to the display unit using CRT, liquid crystal or the plasma, etc., in order to make effectiveness more nearly visual than before the optimal are prepared in the front panel or the tooth back. Looking at the screen of a display unit, the operator is constituted so that the brightness and contrast may become the optimal, and such adjustment volumes can be operated. Moreover, in the distributed control system which was made to perform control of a process based on various kinds of information displayed on the display unit, although a display unit will be built into an operator station, such adjustment volumes are installed in a periphery or an actuation side (or keyboard) of a screen (CRT) etc. in this case.

[0003]

[Problem(s) to be Solved by the Invention] However, in the conventional equipment of such a configuration, adjustment volume needed to take the installation into consideration to the required top as hardware, and the technical problem that a configuration became complicated occurred. Moreover, the technical problem of being unable to take adjustment on a design with the key for control operation, a switch, etc. occurred. This invention was made in view of such a point, and the purpose is in offering the display unit which can perform adjustment of various kinds of screen-display conditions for making the brightness of a display unit, and the vision of human being like contrast suit the optimal by software without using adjustment HORYUMU.

[0004]

[Means for Solving the Problem] The display section which needs the adjustment for fitting this invention which attains such a purpose to human being's vision, The control section which outputs the image information displayed on this display section as a display signal, It is the display unit equipped with the input section which

combines with this control section and inputs various kinds of data and indication signals. A display condition directions means to perform the directions for adjusting and setting the display condition of the screen displayed on said display section as said input section is established. The display display circuit which outputs the image information displayed on the display section to said control section as a display signal, The adjustment data forwarding circuit which sends out display condition adjustment data based on the directions from said input section, The superposition circuit which superimposes the display condition adjustment data from said adjustment data forwarding circuit on a display signal from a display display circuit is prepared. The adjustment data separation circuit which receives the signal sent from the control section in said display section, and divides display condition adjustment data and a display signal into it, The register group for adjustment data-hold holding the adjustment data changed according to the separated display condition adjustment data, It is the display unit characterized by establishing the control means which controls the display condition of the screen displayed on the display section according to the adjustment data currently held at these register groups for adjustment data-hold.

[0005]

[Function] The adjustment data forwarding circuit of a control section receives the indication signal for adjusting and setting up the display condition of the screen inputted from the input section, and sends out the data for screen-display condition adjustment according to the indication signal. The superposition circuit of a control section superimposes display condition adjustment data on a display signal from a display display circuit, and sends the superposition signal to the display section. The adjustment data separation circuit of the display section separates the adjustment data for adjusting and setting up the display condition of a screen out of the signal sent from the control-section side, gives them to the register group for adjustment data-hold, respectively, and changes the contents. A control circuit controls and sets up the display condition of the screen displayed on the display section according to each adjustment data currently held at the register group for adjustment data-hold.

[0006]

[Example] Hereafter, the example of this invention is explained to a detail using a drawing. Drawing 1 is the configuration block Fig. showing one example of this invention. In drawing, 1 is the display section which needs the adjustment for making human being's vision suit, for example, shows the thing using CRT as a display means. 2 is the control section which outputs various kinds of image information displayed on this display section 1 as a display signal, and the engineering workstation etc. is used. 3 is the input section which combines with a control section 2 and inputs various kinds of data and directions. As this input section, the keyboard, the mouse, etc. are used, for example and it has the directions function in which the directions (for example, directions, data input directions, etc. for adjustment data being

risen/downed) for adjusting and changing the display condition of the screen displayed on the display section 1 can be performed.

[0007] a control section 2 -- setting -- 21 -- a microprocessor and 22 -- the memory connected with this microprocessor 21 and 23 are display display circuits which output various kinds of image information as a display signal. The image information of the screen (screen for display condition adjustment) for adjusting and setting up the display condition of a screen is included in memory 22, and the display display circuit 23 outputs read-out and it for the image information of the screen for display condition adjustment as a display signal from memory 22, when adjusting and setting up the display condition of a screen. 24 follows an input section interface with the input section 3, 25 follows directions from the input section 3, the adjustment data for adjusting and setting up the display condition of a screen are made, the adjustment data forwarding circuit for sending it out and 26 are the superposition circuit superimpose the adjustment data from the adjustment data forwarding circuit 25 to the display signal output to the display section 1, and adjustment data are superimposed by the display signal by the serial signal.

[0008] It is the adjustment data separation circuit which 11 receives the signal sent from the control section 2 in the display section 1, and separates a display signal and adjustment data, and the register group for adjustment data-hold to which the adjustment data which separated 12 are given, and the contents are changed according to the adjustment data sent from the control-section 2 side, and the adjustment data after modification are held. As adjustment data held by these register groups, they are data, such as size of each gain of the brightness which determines the display condition of a screen, contrast, and R, G and B, level, and a perpendicular direction, and a position. Each register consists of memory of a non-volatile, and even if each of each adjustment data currently held becomes off [ a power source ], they disappears. 13 is a control means which displays various kinds of image information on CRT14 according to the display signal sent from the control-section 2 side while controlling the display condition of the screen displayed on CRT14 according to the adjustment data currently held at each register group 12 for adjustment data-hold.

[0009] Thus, actuation of the constituted equipment is explained below. When it is going to change the display condition of the screen of CRT14, the command signal for screen-display condition adjustment is first inputted from the input section 3. The display display circuit 23 in a control section 2 will output read-out and it for the image information of the screen for display condition adjustment as a display signal from memory 22, if this command is received. This display signal is transmitted to the display section 1 side through the superposition circuit 26. The display signal taken out through the adjustment data separation circuit 11 in the display section 1 is impressed to a control circuit 13, and displays the screen for display condition adjustment on the screen of CRT14.

[0010] Drawing 2 is drawing showing an example of the screen for display condition

adjustment displayed on the screen of CRT14. Here, this screen for adjustment is displayed in a window W1, and it constitutes so that brightness (BRT), contrast (CONT), the rise carbon button that can adjust each gain (GAIN) of R, G, and B, respectively, and a down carbon button may be simulated. Moreover, in this screen for adjustment, the test pattern TP is displayed to be convenient for adjustment of screen-display conditions together. In addition, this adjustment screen may be displayed not as a window but as one screen. For example, when adjusting brightness (BRT), the mouse of the input section 3 will be operated, cursor will be put on the rise (increment) directions carbon button BU1 of brightness (BRT), and input directions will be performed from a mouse. Then, the adjustment data which direct to raise brightness are outputted from the adjustment data forwarding circuit 25, and this is overlapped on a display signal and sent to the display section 1 side.

[0011] Drawing 3 is the wave form chart of the transmission signal sent to the display section 1 side from the superposition circuit 26 of a control section 2. From the display display circuit 23, the display signal VS for displaying the screen for adjustment (window W1) is sent, the specific time slot within the Horizontal Synchronizing signal (periodic 1H) included in this display signal is overlapped on the adjustment data TD from the adjustment data forwarding circuit 25, and they are outputted to it. Drawing 4 is the configuration conceptual diagram of this adjustment data TD. Here, it is 8 bit patterns and parity is assigned to a 4-bit adjustment element number (for example, data with which brightness and 0001 direct contrast and, as for 0010, 0000 directs adjustment of the gain of R), the data (1 is increment directions and 0 is reduction directions) of the rise (increment) or down (reduction) directions to the following 1 bit, and the following 1 bit between the start bit and the stop bit.

[0012] Adjustment data are taken out in the adjustment data separation circuit 11, and a superposition signal as shown in drawing 3 sent to the display section 1 side is given to a corresponding adjustment data register group, respectively. That is, if it is the indication signal which raises the brightness mentioned above, after passing through a parity check, data as shown in "00001" will be taken out as adjustment data, and the contents of the register for brightness will increase. The control circuit 13 is controlling the screen-display conditions of CRT14 based on the signal from the adjustment register group 12, and if it is changed so that the contents of the brightness register mentioned above may increase, it will control them according to this to increase brightness. Moreover, the guide ID 1 which shows the adjustment position of brightness to coincidence in the screen for adjustment (window W1) is indicated by migration in the direction of a according to the contents of updating of a brightness register. An operator performs [ while observing a test pattern TP or the display situation of other parts for the modification situation of the brightness of a display screen, ] input directions of the rise (increment) directions carbon button BU1 of brightness (BRT), looking at a motion of a guide ID 1, or performs down directions, and solves input directions in the place where the display condition was adjusted to

the optimal condition. By this, the adjustment data of the optimal brightness for a brightness register will be held.

[0013] It can adjust similarly about contrast and each gain of RGB. Each adjusted data is held in the condition of not disappearing also after making a power source a corresponding register at OFF. In addition, although the above-mentioned example explained the case where this was operated with a mouse etc., using what is shown in drawing 2 as a CRT adjustment screen, you may be other configurations of those other than drawing 2, and a test pattern hopes that there is nothing. Furthermore, as an operator actually directs with a finger etc. the manual operation button currently displayed on the screen, using a touch screen as the input section 3, it may be made to adjust various kinds of screen-display conditions. Moreover, you may constitute so that adjustment data, such as a tilt function which carries out migration adjustment for example, of the CRT screen mechanically in a legible include angle and a legible location, may be sent out of the brightness of a display screen, or contrast as an adjustment element for making human being's vision suit.

[0014]

[Effect of the Invention] As explained to the detail above, according to this invention, software can perform that it is the optimal and easily adjustment of various kinds of display conditions for making the vision of human beings, such as brightness of a display unit, and gain of contrast or RGB, suit without using adjustment volume. Moreover, it becomes possible to utilize effectively the front panel of the area which it becomes unnecessary to have installed adjustment volume etc. in the front panel or the side face, and the degree of freedom on a design not only increases, but was restricted. Moreover, adjustment data can perform association between a control section and the display section easily by having considered as a configuration which superimposes on a display signal and is sent.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the configuration block Fig. showing one example of this invention.

[Drawing 2] It is drawing showing an example of the screen for display condition adjustment displayed on the screen of CRT.

[Drawing 3] It is the wave form chart of the transmission signal sent to a display section side from the superposition circuit of a control section.

[Drawing 4] It is the configuration conceptual diagram of adjustment data.

[Description of Notations]

1 Display Section

11 Adjustment Data Separation Circuit  
12 Register Group for Adjustment Data-hold  
13 Control Circuit  
14 CRT  
2 Control Section  
21 Microprocessor  
22 Memory  
23 Display Display Circuit  
24 Input Section Interface  
25 Adjustment Data Forwarding Circuit  
26 Superposition Circuit  
3 Input Section

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